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have been of comparatively small vertical extent, the elevation of mountain-chains being formed by lateral thrust.—The March number of the *American Journal of Science* contains the second of a series of articles upon the flood of the Connecticut River valley from the melting of the Quaternary glacier, by J. D. Dana. The average depth of this flood, taken from the level of the wide terrace out of which the present river-bed is hollowed, was 140 feet north of the Massachusetts line, and about 125 feet in Massachusetts and Connecticut.—In the same magazine C. D. Walcott describes a new genus of the order Eurypterida, from the Utica slate. As far as known no example of the Eurypterida has previously been described from a lower horizon than the Medina sandstone.—At a recent meeting of the Paris Academy of Sciences, M. Emile Blanchard stated that the condition of the fauna and flora of New Zealand showed it to be a remnant of a southern continent submerged during the modern epoch of the earth's history.

MINERALOGY.¹

PSEUDO-SYMMETRY.—Much interest has been excited among crystallographers in those curious crystalline forms, which, while appearing to be simple forms belonging to one system of crystallization are now regarded as composed of a number of twinned crystals of another system. These are the crystals which exhibit the "optical anomalies" for which so many explanations have been offered.

Some recent investigations in this direction appear to be overturning our most elementary mineralogical conceptions. Thus, the garnet, for example, so constant in crystalline form, notwithstanding the great variations in composition, has always been considered a type of the isometric system. Yet, by means of delicate optical investigation, the conclusion has been reached that several of the varieties of garnet are not simple dodecahedrons, as indicated externally, but are composed of twelve orthorhombic crystals symmetrically arranged around a central point. It has moreover been stated that in the case of the varieties topazolite and ouvarovite, each of these twelve orthorhombic crystals are themselves composed of four more elementary crystals, making a group of 48 crystals in all to produce each apparently simple form.

Pseudo-symmetrical crystals formed by a less number of twins arranged around a line or plane have long been known. The three crystals often twinned in aragonite, the four in harmotome, the six in witherite and the eight in rutile are familiar examples of twins symmetrically placed around a line. The repeated twinings in the plagioclase feldspars offer an example of numerous twins on a single plane.

¹ Edited by Professor HENRY CARVILL LEWIS, Academy of Natural Sciences, Philadelphia, to whom communications, papers for review, etc., should be sent.

But the arrangement of twins around a *point* has not been known until recently. A simple example of this new kind of twinning and of the method of detecting it may be given in the case of Romeite. This mineral crystallizes in simple octahedrons, and had therefore been supposed to be isometric. Bertrand has endeavored to show that the octahedron of Romeite is in reality a twinned arrangement of eight rhombic crystals grouped symmetrically around a point. He found that if a section be cut between the summit of the octahedron and the center of the crystal, parallel to the cubic face, and this be examined in polarized light, it will show, if parallel rays be used, four similar right-angled triangles each having its hypotenuse either parallel or perpendicular to the plane of polarization; if, however, converging rays be used, each triangle will show a cross and a series of rings, indicating an optic axis for each, which is oblique to the section, but which bisects the right-angle of each triangle. If now a section is cut parallel to any octahedral face, and is examined in converging rays, a central cross and series of rings appear, just as in a uniaxial crystal, and indicate an optic axis normal to the octahedral face. He holds, therefore, that the whole octahedron of Romeite is composed of eight uniaxial (rhombic) crystals arranged around a point.

The investigations of Descloiseaux, Vom Rath, Bertrand, and more especially Mallard, tend to the belief that quite a number of apparently simple crystals of one system are in reality groups of crystals of a higher system.

Among the *pseudo-isometric* crystals, are, as Mallard has shown, topazolite, formed of 48 triclinic crystals, having for their bases the faces of a hexoctahedron, and arranged in 12 different positions; ouvarovite, formed of 12 orthorhombic crystals, corresponding to each face of the dodecahedron and arranged in 6 different positions; boracite, formed of 12 orthorhombic crystals whose summits are at the center of the crystal, as in ouvarovite; leucite, an assemblage of monoclinic crystals; senarmontite, whose octahedrons are composed of 48 orthorhombic crystals as in topazolite (this being an interesting result when taken in connection with the orthorhombic form of valentinite, hitherto supposed to be a dimorphic form of oxide of antimony); analcite, whose anomalous optical characters have long been known, now shown to be formed of 24 orthorhombic crystals, corresponding to the faces of a tetrahexahedron; fluorite, probably composed of interlacing rhombic crystals. To these, Bertrand has added Ralstonite, and, very recently, Rhodizite, both of which are composed of twinned biaxial crystals. Among *pseudo-tetragonal* crystals may be mentioned apophyllite, idocrase and zircon, now shown to be assemblages of monoclinic crystals; while as regards rutile, octahedrite and brookite, generally supposed to prove the trimorphic character of titanite acid, the interesting

conclusion has been reached by Mallard that the elementary form of titanite is monoclinic with tetragonal habit, and that each of those minerals represent merely different twinning arrangements of the same elementary form. Apatite, tourmaline, emerald and corundum are examples of *pseudo-hexagonal* minerals, formed by the twinning of orthorhombic crystals, while other examples might be given in the remaining systems.

Interesting as are the conclusions here reviewed, it is to be remembered that other and more simple explanations of these "optical anomalies" have been offered, which do less violence to our crystallographic ideas and are perhaps nearer the truth. Most of the mineralogists of Germany are opposed to this twinning hypothesis, and hold that all the optical phenomena in question can be explained by irregularities of internal tension in the crystal. The fact, recently discovered, that when amorphous gelatine is cast in the form of a crystal, it frequently shows, after drying, optical phenomena identical with those under discussion (*c. g.*, analcite), lends great weight to this latter and more simple hypothesis.

HIERATITE, A NEW MINERAL.—At the February meeting of the Mineralogical Society of France, M. Cossa described a new mineral which occurs in microscopic crystals in volcanic tufa around the fumaroles of the crater of the Island of Vulcano (one of the Lipari islands). The minute crystals dissolve in boiling water to form an acid solution, from which there soon separates a gelatinous substance which, after desiccation, becomes a mass of transparent isometric crystals, of which the predominant form is the cube modified by the octahedron. The composition of the crystals was found to be that of a fluosilicate of potassium $2\text{KFl}, \text{SiFl}_4$. The name, Hieratite, is suggested by the Greek name of the island, *Ἱερά*.

Hieratite occurs abundantly in the stalactitic concretions which cement the tufa and decomposed lava, and is associated with selensulphur, realgar, mirabilite, glauberite, sassolite; the alums of potassium, caesium and rubidium; and the soluble salts of arsenic, iron, thallium, zinc, tin, bismuth, lead and copper.

Attention is called to the abundant occurrence of a compound of tin soluble in water, possibly an alkaline fluostannate, and to a soluble bismuth salt, both of which may be new.

MONAZITE FROM VIRGINIA.—Prof. G. A. König¹ has identified monazite from the mica mine in Amelia Co., Va., thus adding still another rare mineral to the list already reported from that locality. It occurs in masses, some of which are from fifteen to twenty pounds in weight. Two varieties were noticed, one having an amber or brown color, a straw-colored powder and a spe-

¹ Proc. A. N. S., Phila., Jan. 24, 1882.

cific gravity of 5.4; the other being gray, yellow in thin splinters, and greenish-gray in powder, and with a specific gravity of 5.1.

The mineral is decomposed by concentrated sulphuric acid and has the following composition:

(Ce La Di Y) ₂ O ₃	(Y Fe Ca) ₂ O ₃	P ₂ O ₅	ignition
73.82	1.	26.05	.45

SOME SUPPOSED NEW SCOTTISH MINERALS.—*Pilolite*, *Rubislite*, *Xantholite*, *Balvraidite*, *Abriachanite*, *Haughtonite*, *Walkerite*, *Bhreckite*, *Tyreeite* and *Torbermorite* are names given by M. F. Heddle¹ to some supposed new minerals from Scotland. Some of these are certainly mixtures and products of decomposition; others are provisional names given to substances "which may prove to be new," and most of them require further examination before being entitled to be classed as new species. Names so given are of little advantage to the science of mineralogy. The numerous analyses given by Dr. Heddle are his most valuable contributions to science.

Pilolite is the name given to "mountain leather," usually regarded as a fibrous amphibole. *Rubislite* greatly resembles the doubtful mineral *Hullite*, and is found in red granite. *Xantholite* occurs in impure yellow nodules, somewhat resembling *chondrodite*, and appears to be an alteration product. It resembles "grenatite." *Balvraidite* is an altered felspar, resembling *Bytownite*. *Abriachanite* is a bluish mineral which may be either fibrous, slaty, powdery or clayey. It is a silicate of iron and magnesia and undoubtedly a decomposition product. *Haughtonite* is a black mica resembling *biotite*, but containing more iron and less magnesia. It is found in granite at numerous localities. It appears to be identical with the mica from Pike's Peak, Colorado, previously named, by the present writer, *Siderophyllite*. *Walkerite* is a variety of *pectolite* containing magnesia. *Bhreckite* is a soft, granular, pale green substance not unlike *glauconite*, but of uncertain affinities. It occurs in veins in granite. *Tyreeite* is the name provisionally given to a red mud left after dissolving a large amount of marble in hydrochloric acid. It is undoubtedly a mixture. *Torbermorite* is a massive, uncleavable zeolite whose main constituents are SiO₂ 47, Al₂O₃ 3, CaO 33.7 H₂O 12.4. It is said to possess no reactions distinguishing it from other zeolites.

MENACCANITE, LEUCOXITE AND TITANOMORPHITE.—A. Cathrein,² after a careful investigation of the titaniferous minerals of the Northern Tyrol announces the following conclusions:—

(1.) That apparently homogeneous menaccanite exhibits microscopical inclusions of rutile, and that the excess of titanic acid and the alteration of the normal ratio of Ti : Fe = 1 : 1 can be demonstrated by analysis.

¹ Proc. Min. Soc. Gt. Britain.

² Zeits. f. Kryst., 1882, VI, 244.

(2.) That the so-called Leucosite is no new mineral, but is titanite with or without admixture of rutile microliths.

(3.) That the so-called titanomorphite is not a new lime titanate, but is also titanite.

(4.) That the red brown decomposition products surrounding menaccanite are rutile, not hematite, and were originally enclosed in the menaccanite, since dissolved.

NEW MINERALS.—*Heldburgite* is the name given by O. Luedecke to some minute yellow columnar crystals found in the phonolite of Heldburg, in Coburg, and supposed to be new. The mineral is associated with zircon, and somewhat resembles that species. It is infusible, transparent, with white streak and adamantine lustre, and of unknown composition.

Krugite.—This is a new sulphate of calcium, magnesium and potassium found in the Stassfurt rock-salt deposits. It is crystalline, with a hardness of 3.5, and specific gravity of 2.8. In hot water potassium and magnesium sulphates are dissolved, gypsum remaining; but in cold water the potassium sulphate alone is dissolved, the double salt $K_2SO_4 \cdot CaSO_4 + H_2O$ remaining insoluble. It has the following composition: K_2SO_4 18.2, $MgSO_4$ 13.5, $CaSO_4$ 63.4, H_2O 4.1, $NaCl$.5—as though a mixture of anhydrite and polyhalite.

MINERALOGICAL NOTES.—The white *tourmaline* crystals of De Kalb, St. Lawrence county, New York, have been carefully measured by G. Seligman, and are the subject of an exhaustive paper in the last number of *Zeitschrift für Krystallographie und Mineralogie*.

The *boracite* crystals which occur in the kainite beds at Stassfurt are soft and pliant and under water fall to pieces to form a slimy mass. They have the same composition as the ordinary hard boracite of the carnallite beds.

By submitting crystals of *nephelite* to the action of weak hydrofluoric acid, certain etch-figures are produced which, according to a recent paper by Baumhauer, prove that nephelite crystals are always twins. The twins are regarded as the result of trapezohedral hemiedry in combination with hemimorphism according to the principal axis.

The discovery by Mr. W. E. Hidden, of remarkably fine *emeralds* in North Carolina, is of much interest. A well known Philadelphia mineralogist is the fortunate possessor of one of these emeralds, which is a perfect hexagonal prism of deep green color, having a length of over ten inches—a size probably unsurpassed by any emerald in existence.

The *prehnite* of Farmington, Conn., has, according to Desclois-eaux, remarkable optical properties, probably due to the superposition of numerous lamellæ in different positions as regards their crystallographic axes.

Simple dodecahedrons of *fluorite* are very rare. They have recently been found in the department of Puy de Dome, France.

The proof of the identity of two species is as important as the discovery of a new one. Descloiseaux and Koksharow have recently shown by crystallographic measurements that *vauquelinite* and *laxmanite* are identical. Laxmanite had been distinguished from the vauquelinite of Siberia by Nordenskiöld in 1867, under the impression that the more lustrous crystals, of somewhat different form and brighter green color belonged to a distinct species.

Kieserite, a sulphate of magnesia found in the Stassfurt salt mines, when placed in water is broken up into a crystalline meal, which, on exposure to the air, sets to a hard, cement-like mass. It has been used as a cement. It has been shown that the formation of the cement is due merely to the compression of the mineral upon drying.

GEOGRAPHY AND TRAVELS.¹

THE CAROLINE ARCHIPELAGO. — The Caroline Islands have recently been visited by the British war steamer *Emerald*. Her commander, Captain Maxwell, reports his arrival at Strong Island on June 25, 1881. He describes it as mountainous with lofty peaks, some 2000 feet above sea-level, clothed with verdure to the summits; bread-fruit, bananas, etc., grow in abundance, but cocoa-nuts are far less plentiful than in the low coral islands, and, owing to the bountiful supply of water, they are not much needed. The ancient walls and fortifications on the small island of Lélé, where the king lives, are very extraordinary. The walls are some twenty feet high, having been in former times probably as high everywhere, and twelve feet thick, and are built of enormous basaltic rocks which must have been brought from a distance, and have cost much labor and ingenuity to raise them to their present position. The natives of Strong Island are described as a most gentle, amiable and intelligent race; they are lighter in complexion than the Marshall islanders. Captain Maxwell afterwards visited Ponafi, or Ascension Island, in the Simavina group, the population of which is stated to be 5000. This island is divided into several districts each of which has its own chief. The natives are particularly pleasant and good-looking; Captain Maxwell thinks they have more refined features than any he has seen, but they are not so well dressed or advanced as the inhabitants of Strong Island—the grass petticoat, indeed, seemed to be the principal article of clothing. The island is about fourteen miles square and very beautiful, with lofty peaks from 2000 feet

¹ Edited by ELLIS H. YARNALL, Philadelphia.